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Rhynchocinetes striatus, a New Species (Decapoda, Caridea, Rhynchocinetidae) from Southern Japan

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ABSTRACT—A new rhynchocinetid shrimp, *Rhynchocinetes striatus* sp. nov., is described and illustrated. It is characterized by a unique color pattern of alternate white-and-red bands around the body, as well as by the very slender, elongate rostrum bearing numerous ventral teeth, the antennal scale bearing a very short distolateral spine never reaching the end of the lamella, and the relatively slender posterior three pereopods bearing three ventral spinules on the dactylus. Its affinities to the related species are discussed.

INTRODUCTION

In several recent popular publications, beautiful color photographs of shallow water decapod crustaceans, including some shrimps of the genus *Rhynchocinetes,* were presented [1, 2, 6]. Among these crustaceans is a rather large rhynchocinetid which is characterized by obliquely or transversely arranged, alternate white-and-red bands on the carapace and abdomen, the color pattern being apparently different from those of the known species in this genus. In addition to the material reported earlier by one of us [6], several specimens referable to this species have been collected from the Ryukyu Islands, southern Japan. Close examination discloses that the species is closely related to *R. hiatti* Holthuis and Hayashi, *R. hendersoni* Kemp, or *R. rigens* Gordon, but undoubtedly is referred to a new species described below.

The holotype will be deposited in the National Science Museum, Tokyo (NSMT) and the paratypes are in the Shimonoseki University of Fisheries (SUF) and Sabiura Marine Park Research Station (YMP). Carapace length (CL) and rostrum length (RL) are used for measurements.

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DESCRIPTION

Rhynchocinetes striatus sp. nov.
(Figs. 1–4)

Rhynchocinetes sp. Debelius, 1983, p. 68, with fig. [1].

Rhynchocinetes sp. Debelius, 1984, p. 68, with fig. [2].

Rhynchocinetes sp. Kamezaki, Nomura, Hamano and Misaki, 1988, p. 74, with fig. [6].

Material.—Holotype: Ovigerous ♀ (NSMT, 18.1 mm in CL, 29.8 mm in RL), Kadena Port, Okinawa Island, 1–10 m deep, April 5, 1989, H. Masuda leg.

Paratypes: 1♂ (SUF 530-2-1360, 17.2 mm in CL), 1♀ (SUF 530-2-1361, 19.1 mm in CL), 2♂ (YMP-550, 16.0 mm in CL, YMP-553, 9.5 mm in CL): Hori, Kuroshima Island, Yaeyama Group, 3 m deep, June 27–28, 1987, K. Nomura leg; 2♂ (YMP-611A, 15.9 mm in CL, YMP-613B, 12.9 mm in CL): Hori, Kuroshima Island, Aug. 2, 1987, K. Nomura leg: 1 juv. (SUF 530-3-1362, 7.3 mm in CL): Hori, Kuroshima Island, November 27, 1987, K. Nomura leg.

Description.—Shell rather hard, with many transverse striae on carapace. Rostrum 1.3–2.2 times as long as carapace, overreaching antennal scale by nearly distal half of its length; longer in larger male (Figs. 1, 2*a*). Three teeth on carapace

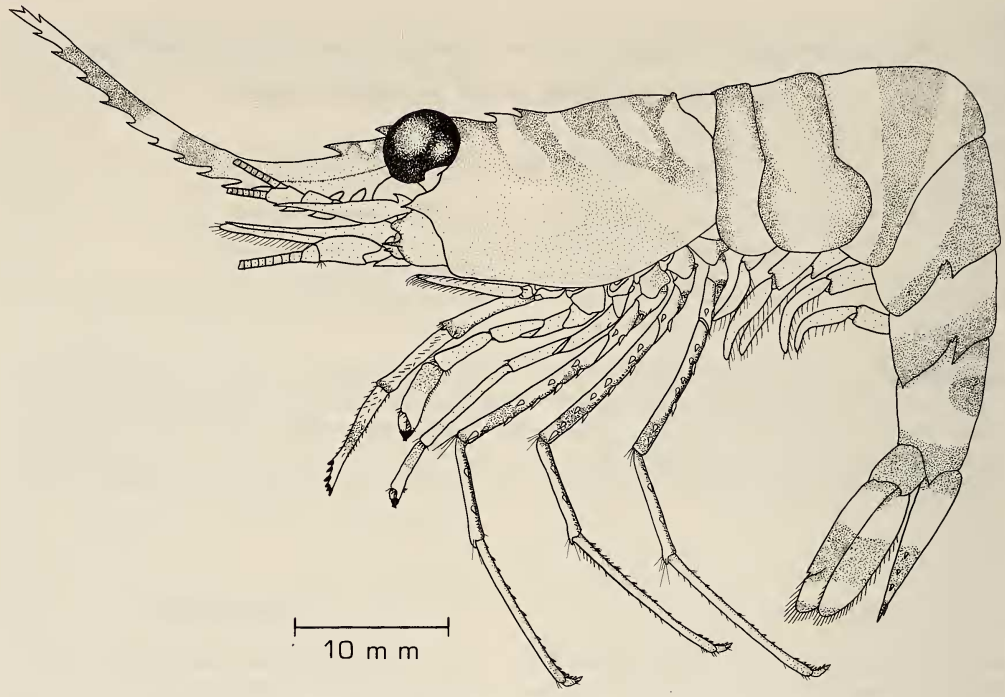

FIG. 1. *Rhynchocinetes striatus* sp. nov. Male paratype (YMP-550), showing color pattern; dotted parts are red.

directly behind rostral articulation. Dorsal margin of rostrum with 2 rather large teeth on proximal part, distal part unarmed except for 2 small subapical teeth. Ventral margin with 11–13 teeth, 12 teeth in 4 specimens including holoytpe, 11 teeth in 1 specimen and 13 teeth in 2 specimens. Antennal spine well developed. Pterygostomial angle largely rounded (Fig. 2*a*).

Abdomen also with fine striae, oblique in first 2 somites, nearly longitudinal in third somite, and transverse in last 3 somites. Pleura of first 3 somites rounded. Fourth somite with strong, posteriorly directed spine on posterior margin just above base of pleuron, posterolateral angle of pleuron with or without small spine in male. Three males (9.5, 12.9, 17.2 mm in CL) bearing this small spine on both sides but 2 males (15.9, 16.0 mm in CL) lacking it on either side. In females including holotype, pleuron produced posteriorly but not sharply pointed, lacking spine. Pleuron of fifth somite with stronger spine near base and well developed one on posterolateral agle in both sexes (Fig. 2*b*). Sixth somite about 1.5–1.8 times as long as fifth somite. Telson 1.1–1.3 times as long as sixth somite, with 3 pairs of dorsal spines on posterior half of its length; posterior margin ending in triangular median point, with 3 pairs of spines; lateral pair short, median pair longest (Fig. 2*c*).

Eyes very large. Cornea broad and rounded, with semicircular ocellus. Stylocerite sharply pointed at distal end, with anteriorly directed dorsal tooth at base, falling slightly short of end of antennular peduncle. First antennular segment with small spine at anterolateral angle. Second and third segments unarmed and subequal in length (Fig. 2*d*).

Large male paratype, 17.2 mm in CL, with nearly intact antennular and antennal flagella; upper antennular flagellum relatively long, about 4 times as long as its peduncle, basal part slightly overreaching rostral apex, more or less enlarged, bearing setae ventrally; lower flagellum longer than upper, about 5.5 times as long as peduncle. Antennal flagellum much longer, about 9 times length of carapace.

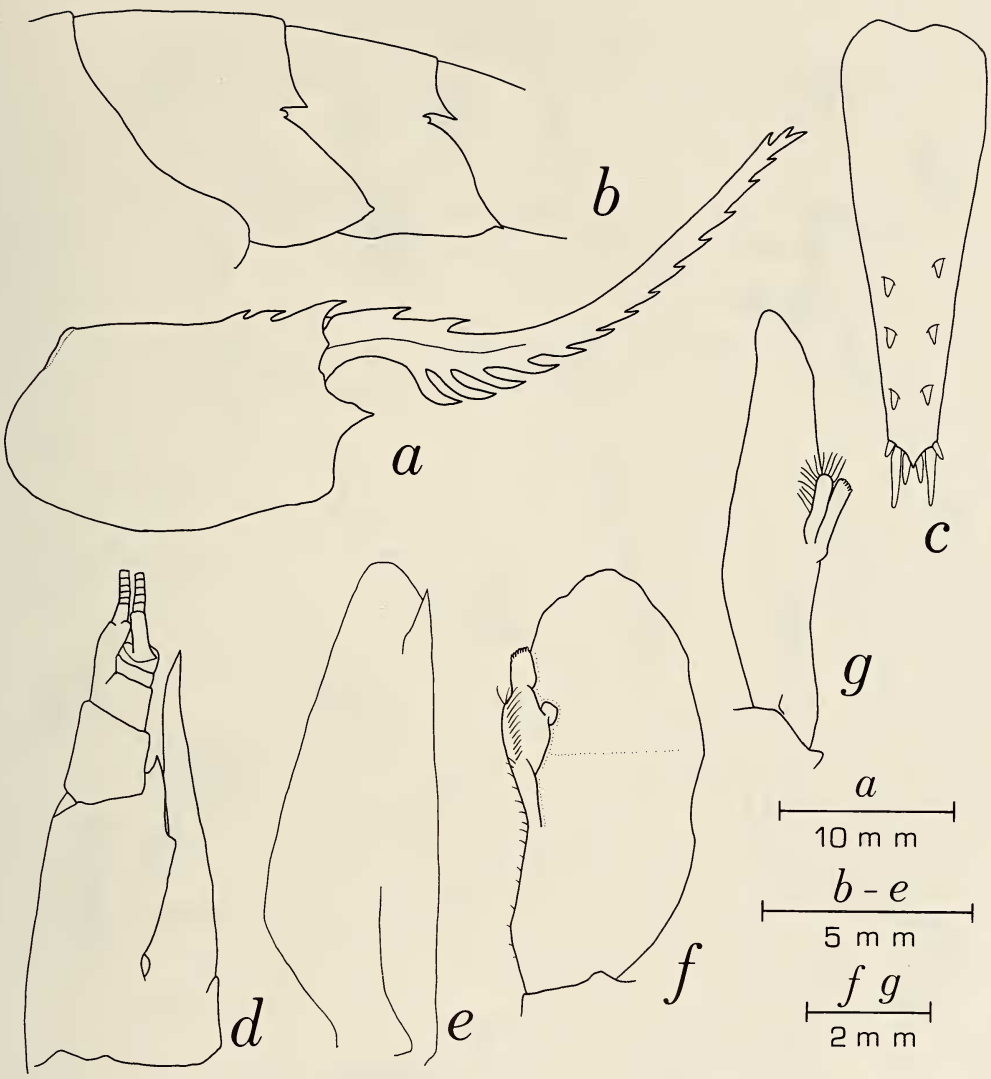

FIG. 2. *Rhynchocinetes striatus* sp. nov. Male paratypes (*a, c-g*: YMP-550; *b*: YMP-553). *a*, carapace, *b*, fourth and fifth abdominal somites, *c*, telson, *d*, antennular peduncle, *e*, antennal scale, *f*, endopod of first pleopod, *g*, endopod of second pleopod.

Antennal scale 2.6 times as long as broad, distolateral tooth not reaching end of lamella (Fig. 2*e*). Basicerite with sharply pointed large lateral spine and rounded dorsal lobe, small spiniform process on membranous articulation with antennal scale.

Mouthparts (Fig. 4) and branchial formula typical of genus. Mandibular palp three-segmented (Fig. 4*a*). Palp of first maxilliped also three-segmented, distal segment very small (Fig. 4*d*). Third maxilliped and first 3 pereopods with pleurobranch and arthrobranch, posterior 2 pereopods with pleurobranch only. Epipods distinct on all maxillipeds (Fig. 4*d-f*) and first 3 pereopods; exopods on all maxillipeds. Third maxilliped reaching nearly to distal end of antennular peduncle in both sexes; distal segment with about 10 dark spinules distally; basal segment with slender spine on anterolateral end and 2 or 3 movable spines on anteroventral corner; exopod

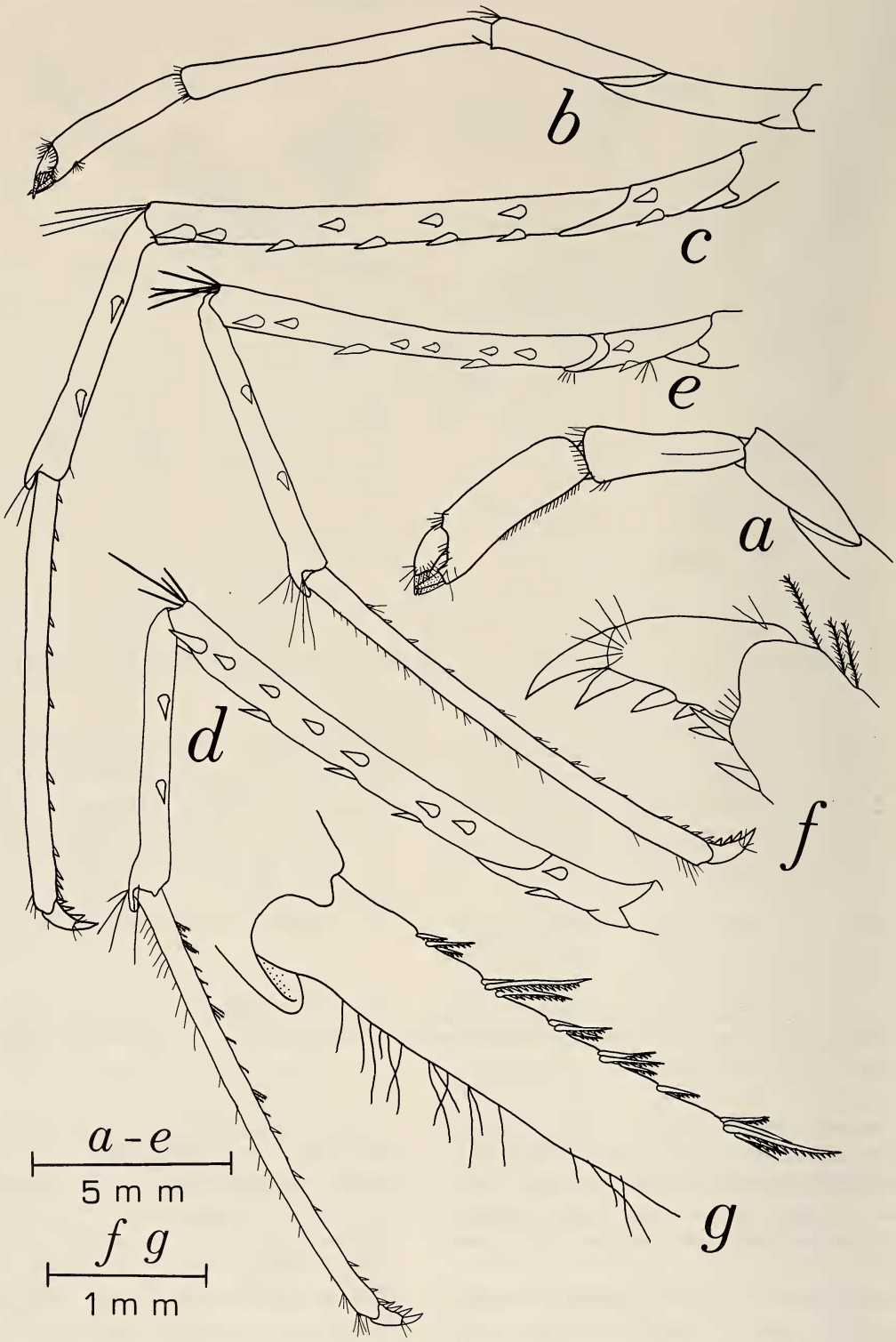

FIG. 3. *Rhynchocinetes striatus* sp. nov. Male paratype (YMP-550). *a*, first pereopod, *b*, second pereopod, *c*, third pereopod, *d*, fourth pereopod, *e*, fifth pereopod, *f*, dactylus of third pereopod, *g*, proximal part of propodus of fourth pereopod.

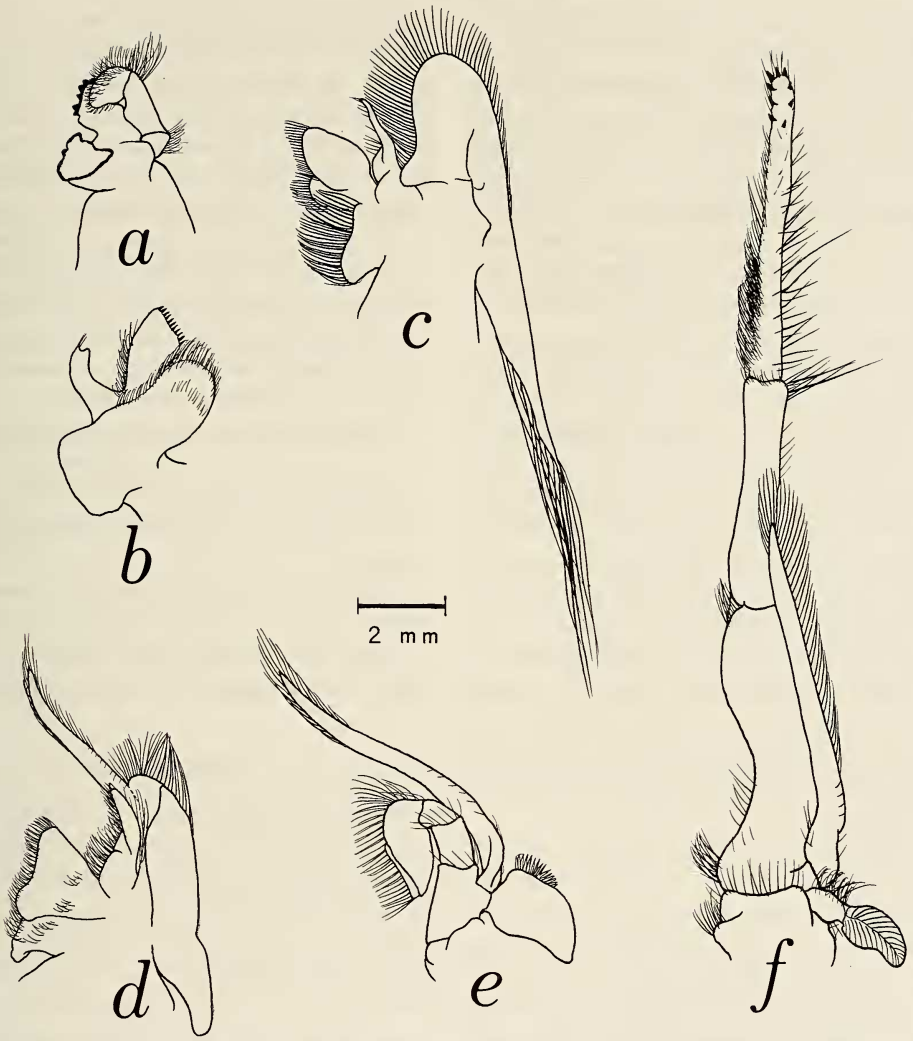

FIG. 4. *Rhynchocinetes striatus* sp. nov. Female paratype (SUF 530–2–1361). *a*, mandible, *b*, maxillule, *c*, maxilla, *d*, first maxilliped, *e*, second maxilliped, *f*, third maxilliped.

relatively long, extending beyond distal end of basal segment (Fig. 4*f*).

First pereopod reaching distal end of carpocerite of antennal peduncle in both sexes. Dactylus with 8–10 dark claws distally, fixed finger with 3 similar claws. Palm twice as long as dactylus in female, but more longer in male. Carpus equally long as merus or palm in female, and as long as merus but shorter than palm in male (Fig. 3*a*). Second pereopod reaching in female or slightly overreaching in male distal end of first pereopod. Chela slightly longer than merus. Dactylus with 14 black claws, fixed finger with 3 similar claws. Palm 2.4–3.0 times as long as dactylus. Carpus 2.0–2.4 times as long as palm. Ischium shorter than merus (Fig. 3*b*).

Posterior 3 pereopods slender. Third pereopod overreaching antennal scale by dactylus and part of propodus. Dactylus short, bearing 3 black spinules excluding strong terminal claw (Fig. 3*f*). Propodus 5–8 times as long as dactylus, with about 10 posterior marginal spinules. Carpus shorter than propodus, lateral surface with 2 or 3 spinules. Merus longer than propodus, with 5–8 lateral and

3–4 posterior spinules. Ischium with 2 spinules, 1 lateral and 1 posterior (Fig. 3*c*). Fourth pereopod overreaching antennal scale by dactylus. Dactylus short, with 3 claws as in third pereopod. Propodus 6–9 times as long as dactylus, posterior margin with 6–14 spinules; proximal 4 or 5 of them bearing several setae. Carpus about 2/3 length of propodus, with 2 or 3 lateral spinules. Propodus and carpus of fourth pereopod slightly longer than respective segments of third pereopod. Merus of fourth pereopod slightly shorter than that of third pereopod, as long as or shorter than propodus of fourth pereopod, lateral margin with 5–9 spinules, posterior margin with 3–7 spinules. Ischium with 1 lateral and 1 posterior spinule (Fig. 3*d*, *g*). Fifth pereopod reaching distal end of antennal scale. Dactylus with same armature as in 2 preceding pereopods. Propodus as long as that of fourth pereopod, with about 10 spinules on posterior margin, lacking proximal setose spinules as in fourth pereopod. Carpus as in fourth pereopod. Merus apparently shorter than propodus, as well as those of 2 preceding pereopods, bearing 5–6 lateral and 1 or 2 posterior spinules. Ischium with 1 lateral spinule, posterior spinule occasionally absent (Fig. 3*e*).

In male, 17.2 mm in CL, endopod of first pleopod broad leaf-shaped, distally bearing two-lobed appendix interna arising from midpoint of mesial margin of endopod. Lateral and distal margins of endopd lacking setae or hairs, but mesial margin with short simple setae, mesial margin of appendix interna with rather long simple setae (Fig. 2*f*). In females, endopod of first pleopod similar to, but larger than exopod covered with long plumose marginal setae; appendix interna absent. Appendices interna and masculina on endopod of male second pleopod short rod-shaped. Appendix masculina as long as or slightly shorter than appendix interna, with numerous long setae (Fig. 2*g*).

Color in life.—Body with transversely arranged alternate bands of red and white (Fig. 1) [1, 2, 6]. Rostrum with 3–5 red bands and white apex. Carapace with 4 red bands running obliquely backward on lateral surface, anterior bands short, usually disappearing dorsolaterally. Abdomen with 8 transverse red bands; anterior 2 bands narrow, situated on anterior margins of first and second somites; third band present along posterior margin of second somite; fourth band broad, placed on midtransverse portion of third somite; fifth band broad dorsally, covering posteromedial cap of third somite and entire dorsal surface of fourth somite, extending downward along posterior margin of fourth somite; sixth band along posterior articulation of fifth somite; seventh band present on posterior margin of sixth somite, extending onto base of tail fan; last band placed on posterior part of tail fan. Sixth somite with oblong red patch on central dorsal portion.

Pereopods yellowish white dorsally and reddish laterally. Meri of last 3 pereopods with red band near distal articulation, chela of first pereopod with similar red band at base. Antennal flagellum reddish.

The above-mentioned pattern is rather stable and nearly the same in both young and adult.

Etymology.—The Latin *striatus* (striated) alludes to the unique color pattern of the species.

DISCUSSION

The new species belongs to the species group characterized by having three teeth on the carapace behind the articulation with the rostrum [4], in which close relative *Rhynchocinetes hiatti, R. hendersoni* and *R. rigens* are included. They are known from nearly the same tropical area as the new species [3]. The type specimens of the new species were compared with the original and subsequent descriptions of the related species [3–5, 7], as well as with the following reference material collected from the Japanese waters.

R. hiatti: 1 ovigerous ♀, 13.2 mm in CL, from Iriomote Island.

R. hendersoni: 1 broken ♂, from Suruga Bay; 1 ♂, 12.9 mm in CL from Okinawa Island; 6 ♂, 10.5–11.8 mm in CL, 3 ♀, 6.5–9.0 mm in CL, 2 ovig. ♀, 7.3–8.8 mm in CL from Kuroshima Island.

R. rigens: 1 ♂, 13.0 mm in CL from Okinawa Island.

The color pattern is the most distinctive character to recognize this new species, because it is constant and does not change by sex and growth. *R. rigens* has a spotted pattern [3, 6] and *R.*

hendersoni has a mottled one [6]. The new species and *R. hiatti* show a banded pattern of alternate white-and-red bands, but their details are clearly different from each other. In *R. hiatti,* the ground color is red, the abdomen bears two to four narrow white transverse bands, the carapace has two or three oblique or longitudinal bands, and the rostrum is whitish apically and reddish elsewhere [5, 6]. In the new species the white-and-red bands are conspicuous, especially in dorsal view. There are three to five oblique red bands on the carapace, eight red bands on the abdomen including the tail fan and three to five bands on the rostrum [1, 2, 6].

The differences that help to separate the new species from the three related species are given in Table 1. The pterygostomial angle is rounded in *R. striatus* and *R. rigens,* while pointed in *R. hiatti* and *R. hendersoni.* The stylocerite is much longer in *R. hiatti,* exceeding beyond the distal end of antennular peduncle. The three known species have a short stylocerite, just reaching or slightly overreaching the end of the antennular peduncle.

The fifth pereopod is relatively long in *R. striatus,* extending as far forward as the distal end of the antennal scale, instead of reaching to the base of it as in the other three species. In the largest male of *R. striatus,* the third maxilliped is not extremely long as the one shown in *R. kuiteri* [1, 2, 8]. Unusually long first pereopods are sometimes seen in the male of *R. hendersoni* [6] but such examples have not been reported for the other three species including the new species.

The lower rostral teeth of the new species are more numerous than those of the other species. *R. striatus* bears always more than 10 lower rostral teeth, this number is usually less than 11 in the other three species. The dactyli of the last three pereopods bear three spinules in *R. striatus* and *R. hendersoni* but two spinules in *R. hiatti* and *R. rigens.* The merus of the third pereopod bears three or four spinules in *R. striatus* and *R. hendersoni,* two spinules in *R. rigens* and only one spinule in *R. hiatti.* The distolateral spine of the antennal scale in *R. striatus* is short, never reaching the end

Table 1. Comparison of characters among *Rhynchocinetes striatus* sp. nov. and three related species

	R. striatus sp. nov.	*R. hiatti*	*R. rigens*	*R. hendersoni*
Color pattern Rostrum Tail fan	banded about 5 bands 2 transverse bands	banded white rostral apex without band	spotted	mottled
Pterygostomial angle	rounded	pointed	rounded	pointed
Stylocerite	reaching distal end of antennular peduncle	exceeding beyond distal end of antennular peduncle	extending to or a little beyond end of antennular peduncle	not reaching distal end of antennular peduncle
Distolateral spine of antennal scale	falling short of distal end of lamella	overreaching lamella	feebly overreaching lamella	reaching to or slightly overreaching lamella
Third maxilliped in large male	falling short of distal end of antennal scale	overreaching antennal scale	falling short of distal end of antennal scale	overreaching antennal scale
First pereopod in large male	normal	normal	normal	unusually long
Fifth pereopod	overreaching antennal scale	reaching base of antennal scale	overreaching antennular peduncle	overreaching antennular peduncle
Number of lower rostral teeth	11–13	8–11	8–12	8–10
Number of spinules on dactyli of last three pereopods	3	2	2	3
Number of posterior spinules on merus of third pereopod	3 or 4	1	2	3 or 4

of the lamella, while it fully overreaching in the three known species.

As mentioned above, the present species was briefly introduced as *Rhynchocinetes* sp. in earlier papers by living color photographs [1, 2, 6].

This is a shallow water species, usually found on coral reefs. The type-series were collected from the Ryukyu Island. Debelius' specimen was reported from the Great Barrier Reef, Australia [1, 2].

ACKNOWLEDGMENTS

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